

## **Importance of Black Carbon to the Bioavailability of Polycyclic Aromatic Hydrocarbons to Marine Species**

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Polycyclic aromatic hydrocarbons (PAHs) are arguably one of the most widely distributed organic pollutants because of their formation or release during the use of fossil fuels by industrialized societies. Once in the environment, PAHs are transported via atmospheric and aquatic pathways around the world and frequently accumulate in aquatic sediments. Consequently, PAHs are known to range in concentration from very low levels in the parts per trillion (ppt) in areas remote from human activity to parts per million (ppm) at heavily industrialized sites. Contributing to concerns about the wide distribution of PAHs globally is their toxicity to marine species. Many marine organisms are exposed to PAHs through contaminated sediments. In contaminated sediments, the bioavailability of PAHs is controlled by organic carbon formed by the diagenesis of organic matter. Recently, another form of carbon, called black carbon, has been suspected of altering the bioavailability of PAHs in sediments to marine species.

The objective of this study was to determine whether black carbon affects the bioavailability of toxic PAHs to marine organisms. To perform this research, support from the Regional Methods (RM) program was used to establish a cooperative agreement between the U.S. Environmental Protection Agency's (U.S. EPA) Atlantic Ecology Division and researchers at the Massachusetts Institute of Technology (MIT). Also, RM support was used to fund a graduate student at the State University of New York at Stony Brook (SUNY) through the U.S. EPA's National Network for Environmental Management Studies (NNEMS) fellowship program. The study demonstrated that black carbon altered, and often reduced, the bioavailability of PAHs to several marine species. This finding is significant in several ways and to many different constituencies. The results indicate that when regional and state regulators assess ecological risk at freshwater and marine sites contaminated with PAHs, including petroleum and fuel production facilities,

there is a need to evaluate the role of black carbon. For the Office of Research and Development, the greater scientific community, and the Agency, this research demonstrates the importance of understanding the bioavailability of toxic pollutants in order to make accurate regulatory decisions. As a result of this research, several papers have been published in the scientific literature. Further, two U.S. EPA guidance documents complemented by this research are being made available to assist Program Office, Regional, and State regulators in addressing the ecological risks associated with PAHs in a scientifically sound fashion.

This abstract does not necessarily reflect U.S. EPA policy.